DOUGLAS-FIR

TUSSOCK MOTH

DAMAGE IN THE NORTHERN REGION

WHY IS IT IMPORTANT? Outbreaks of Douglas-fir tussock moth, *Hemerocampa pseudotsugata* McD., have developed periodically in the Northern Region. Moth populations begin to increase 4 to 6 years after an outbreak subsides. Outbreaks usually last 2 to 3 years, but have been known to persist, at a low level, for as long as 8 years.

During the early stages of an infestation, single or small groups of trees, growing in the open or around houses and barns, are subject to attack. Patch infestations ranging from 10 to 600 acres also occur.

Severe epidemics can develop in the Northern Region. One of the first lasted from 1927 to 1930 in northeastern Washington, and destroyed more than 300 million board feet of Douglas-fir and grand fir. Another outbreak, from 1946 to 1948, covered nearly 500,000 acres in eastern Washington, northern Idaho, and eastern Oregon. Over 9,000 acres were defoliated from 1955 to 1956 in eastern Washington from Colville southeastward to Latah. From 1961 to 1965, scattered infestations were found around Deer Park, Washington; 4,800 acres were defoliated near Kalispell, Montana; 250 acres south of Polson, Montana; and 191,000 acres in Idaho's Benewah and Latah Counties. Spot infestations were also detected from Spirit Lake south to St. Maries, Idaho, and near Big Arm and Bigfork, Montana. No tussock moths have been found in these areas since 1965.

DAMAGE. Grand fir, Douglas-fir, subalpine fir, and spruce are the favorite hosts of the tussock moth. After they consume all host material, they attack most surrounding trees and shrubs.

In the spring, the caterpillars (larvae) eat the underside of new needles. Later, old needles are eaten or severed near their base and left entwined in silken webbing. Defoliated trees turn reddish-brown by July. Tree tops are defoliated first, and may be heavily webbed. Infested trees can be completely stripped by moths in one season and may die or produce a dead top. More commonly, mortality occurs after several years of successive feeding.

After an outbreak terminates, secondary complications arise. Growth has been retarded.

Douglas-fir trees, in a windbreak near Coeur d'Alene, Idaho, show the results of defoliation by the tussock moth larvae.

Clusters of cocoons on branches and twigs.

Weakened trees, with dead tops, create favorable habitat for disease organisms and may be attractive to bark beetles or borers. Often, seedlings and saplings in the infestation's center are killed; this can result in a change of stand composition.

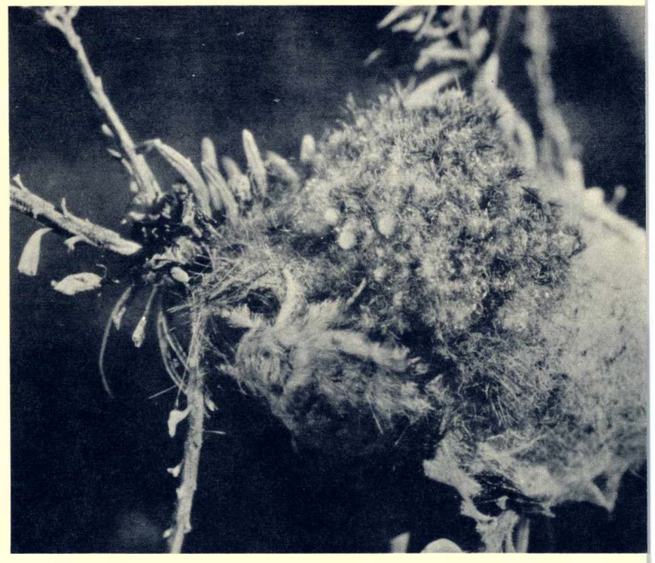
WHAT DO MOTHS LOOK LIKE? Tussock moths get their name from the four dense, buff-colored "tussocks" of hairs located forward along the middle of the back of mature larvae. Larvae are about 1¼ inches long when full grown and have two long, dark tufts or pencils of hairs back of the head. A similar but longer pencil originates from the top of the next-to-last abdominal segment. Shorter hairs cover the body and grow out of red "warts." Body hairs are barbed and may cause a rash on the skin of some people. Female larvae are blackish and have almost white hairs. Males have a lighter color with yellowish or buff hairs.

Female moths are about three-quarters of an inch long, grayish in color, have short thread-like antennae and tiny rudimentary wings which cannot be used for flying. She is almost all abdomen and might be considered as being a "sack full of eggs."

Males have well-developed wings for flying, are grayish, and have feathered antennae. Their wingspread is from 1 to 1¼ inches. The gray forewings are marked with two vague, wavy dark bars and two whitish splotches. Hindwings are brownish.

HOW THE MOTH DEVELOPS. Douglas-fir tussock moths overwinter in the egg stage. Eggs hatch from mid-May to early June. Emerging larvae seek tender new foliage. These first instars are one-eighth inch long, gray, and have long hairs. A combination of light weight and long hair allows them to be transported long distances by the wind.

The first three instars feed on current needles. The last two to three instars feed on older needles, sometimes until the end of July. The pupal, or resting stage, extends from late July through August. The last instar makes a thin co-



Female tussock moth clinging to cocoon below egg mass.

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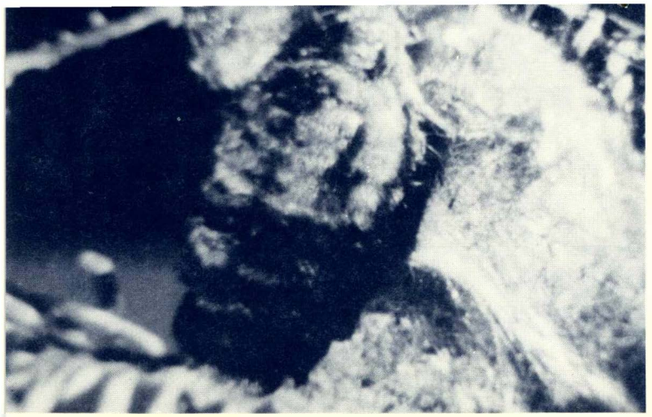


Female tussock moth resting on cocoon. Her head is to top of photo. Note dense body hairs on tail end.

coon of silken webbing mixed with its body hairs to pupate in.

Pupae are often found in large masses on the foliage or trunks of host trees, on ground plants, under rocks, boards, and eaves of buildings near infested trees. Moths emerge from cocoons from 10 to 18 days after pupation. Females cannot fly or crawl very far, so cling to the outside of their cocoons waiting for males to fertilize them. They lay eggs, on the surface of their cocoons, in a mass of frothy, gelatinous substance con-

eggs are laid by each female in three layers within a mass.

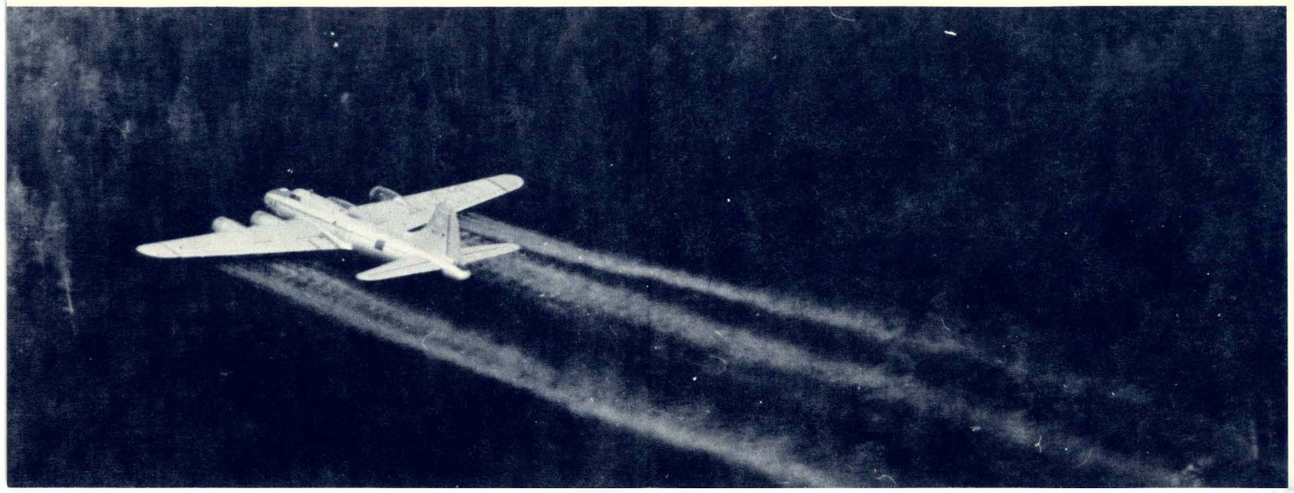
Egg-laying ends the life cycle of the tussock moth; a new generation starts when eggs hatch in the spring.

CONTROL. Surveys in the fall, to determine number of new egg masses and parasitism of pupae, are used to predict infestation trends. When infestations threaten to cause economic losses, chemical controls are available. However, most outbreaks subside due to natural enemies.

Natural control. The most important enemy of tussock moths is a polyhedrosis virus. This virus can kill entire populations.

An aqueous suspension of this virus was applied aerially over 5,000 acres near Moscow, Idaho, in 1965. Results were inconclusive because the virus was already present within the population, and mortality was 100 percent in areas not treated. Later tests in Oregon indicated higher dosages of the virus will give good control of tussock moth larvae. Larvae dying from polyhedrosis may become mummified on fir twigs or may liquefy and drop to lower branches or the ground.

Other enemies of the moth include a small wasp called *Telenomus*, an egg parasite; a Tachinid fly attacking pupae; and another fly, *Pseudosarcophagae affinis*



Applying insecticide to tussock moth infestation.

Male tussock moth, hanging from cocoon. Note feather-like antennae.

(Fall), which parasitized two-thirds of the pupae during an outbreak in eastern Washington in 1955.

Chemical control. Around homes or in farm woodlots, small infestations can be controlled with a power sprayer or mist blower capable of sending insecticides into treetops. For large forest tracts, aerial application is more practical. Before spraying is initiated, it is recommended that the County Extension Agent or the Insect and Disease Branch, Division of State and Private Forestry, Missoula, Montana, be contacted to obtain information about insecticides and application techniques.

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Full grown tussock moth larva on fir needles.

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